

**REMARKS**

Claims 1-12 and 23 are pending in the application. Claim 22 is canceled and new claim 23 is added with this response. Reconsideration of the application is respectfully requested in view of the comments below.

**I. REJECTION OF CLAIMS 1-12 AND 22 UNDER 35 U.S.C. § 103(a)**

Claims 1-12 and 22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,906,294 (Lourigan) in view of U.S. Patent No. 4,544,349 (Nakamura et al.). Claim 22 has been canceled, thereby rendering the issue moot with respect thereto. Withdrawal of the rejection of claims 1-12 is respectfully requested for at least the following reasons.

*i. Neither Lourigan nor Nakamura et al. teach or suggest an electric cord set comprising a voltage or temperature independent timer circuit as recited in claim 1.*

Claim 1 is directed to an oil burner system having an electric cord set that is coupled between a controller and a solenoid valve associated with a pump. *The electric cord set comprises a voltage or temperature independent timer circuit that is operable to active the solenoid valve* a predetermined period of time after a call for ignition signal generated by the controller. Neither Lourigan nor Nakamura et al. teach or suggest this feature.

Lourigan teaches a solenoid valve having time delay circuitry associated therewith. Such circuitry (for example, circuit 34 illustrated in Figs. 1 and 2, and described in Cols. 2-4) is operable to generate a time delay between a call for ignition and an opening of the solenoid valve 16. The circuitry resides on a printed circuit board (PCB) 74 that resides *in the solenoid valve housing 62*, as illustrated in Figs. 4 and 5, and not in the cord set as claimed. As can be clearly seen in Figs. 4 and 5, inclusion of the PCB within the solenoid valve housing 62 requires the solenoid housing size to be substantially increased. Such increased size can be disadvantageous in some

circumstances where the size of the oil burner system is at issue, or when the burner is to be covered by an enclosure. In addition, having the timer circuit in the cord set according to the present invention advantageously permits the timer to be utilized in conjunction with various makes and models of solenoid valve. Therefore Lourigan does not teach a timer circuit ***within an electric cord set*** as claimed.

Nakamura et al. teach a timer 84 in an oil burner safety mechanism, however, the timer appears to operate to open the solenoid (rather than activate it) to extinguish combustion (see, e.g., Col. 5, Ins. 19-33). While the reference does not detail where the circuitry for controlling the solenoid valve resides, ***an analysis of the figures does not show any type of electric cord set as claimed.*** Consequently, neither reference teaches or suggests an electric cord set comprising a voltage or temperature independent timer circuit as claimed.

In addition, not only do the references not teach the invention as claimed, neither reference provides any teaching or suggestion that would motivate one of ordinary skill in the art to modify the teaching of either pieces of art in accordance with the claimed invention. Consequently, the distinction highlighted above is non-obvious over the cited art. Accordingly, withdrawal of the rejection of claim 1 and its depending claims is respectfully requested.

*ii. The substantial differences between the circuit structure of the present invention recited in claims 2-12 and that disclosed in Lourigan are not an obvious matter of design choice as asserted in the Office Action.*

The Office Action explicitly concedes that the circuitry of claims 2-12 is not taught by Lourigan. The Office Action, however, ignores such differences and states that such structure "is simply an obvious matter of design choice as the circuit of Lourigan operates substantially identically to that of applicants and is not regarded as patentably distinct." (O.A., 1/2/04, p. 3, part 5, paragraph 3). Applicants respectfully disagree. The subject matter of claims 2-12 is not obvious in view of Lourigan and such

differences are not a matter of design choice because such circuitry does not operate substantially identically. In re Chu, 66 F.3d 292, 299 (Fed. Cir. 1995)(holding that a finding of obvious design choice is precluded where claimed structure and function it performs are different from prior art).

Lourigan has a timer circuit that provides a time delay that is not appreciably affected by line voltage discrepancies. Therefore in one respect, the timer circuit is interested in a similar result to that of the present invention. However, the manner or function in which such end result is attained is substantially different. The timer circuit 34 of Lourigan functions by the charging of a capacitor 40 through resistors 37 and 38. A zener diode 44 operates to clamp the voltage seen across the resistor 38 and capacitor 40 such that the rate at which the capacitor 40 charges is relatively constant. At a predetermined voltage, a neon light 42 breaks down, thereby triggering an SCR 28 that feeds the line voltage to the solenoid 16. Thus the clamping of the zener diode 44 across the resistor 38 and capacitor 40 and the breakdown voltage of the light 42 dictates the time delay of the circuit 34, despite fluctuations in the line voltage 14 feeding the circuit 34.

The circuitry of the present invention provides a time delay that is substantially independent of line voltage or temperature, ***but such time delay is provided in a different way than Lourigan.*** For example, as recited in claim 3, a comparator circuit compares ***a reference voltage that is a function of the line voltage*** to an output node of a line voltage dependent charging circuit, ***wherein the node charges at a rate that is a function of the line voltage.*** Lourigan provides no such functionality. Rather, to the extent that the neon light 42 can be considered a comparator, it compares the charging of the capacitor 40 to a ***fixed reference*** (that is, the breakdown voltage of the light). Many other claims have similar or other variations in functional operation that are not taught or suggested by Lourigan. Therefore the differences in the claimed invention and the cited art are not obvious design choices, and thus such differences should be given patentable weight and consideration. Consideration of the limitations of claims 2-12 is therefore respectfully requested.

*iii. Lourigan does not teach or suggest a substantially voltage independent trigger circuit comprising a comparator circuit, a reference voltage circuit and a line voltage dependent charging circuit, as recited in claim 3.*

Claim 3 depends upon claim 2, and recites a substantially voltage independent trigger circuit comprising a comparator circuit, a reference voltage circuit, and a line voltage dependent charging circuit. The comparator circuit is operable to compare two signals and output a signal that drives a switch to selectively permit current flow through a bridge circuit based on the comparison. The reference voltage circuit is operable to generate a reference voltage that is a function of the line voltage for one of the comparator inputs. The line voltage dependent charging circuit charges a node between two potentials at a rate that is a function of the line voltage, and inputs that node as the second input to the comparator. Lourigan teaches no such circuitry.

Lourigan does not teach or suggest a reference voltage circuit that is a function of the line voltage. At best, Lourigan's neon light 42 breaks down at a reference voltage, but such breakdown voltage is not a function of the line voltage as claimed. Consequently, the art does not teach the claimed invention, and the secondary reference (Nakamura et al.) does not remedy the deficiencies of the primary reference. Further, one of ordinary skill in the art would not be motivated to modify Lourigan in accordance with the claimed invention. Accordingly, claim 3 is non-obvious over the cited art for these additional reasons, and thus withdrawal of the rejection is respectfully requested.

*iv. Lourigan does not teach a voltage independent trigger circuit as recited in claim 7.*

Claim 7 depends upon claim 2, and recites that the voltage independent trigger circuit comprises a comparator circuit and two charging circuits that have outputs that feed the inputs of the comparator circuit. The first charging circuit charges at a first charging rate and the second charging circuit charges as a second, faster charging

rate. By the operations of the charging circuits a value of one exceeds a value of the other at a predetermined time, wherein the comparator switches. Lourigan does not teach such an arrangement. While the RC circuit (resistors 37, 38 and capacitor 40) of Lourigan may be considered one charging circuit, a second charging circuit is not taught, nor do two such charging circuits feed a comparator circuit as claimed. Nakamura et al. do not remedy the deficiencies in Lourigan. Therefore claim 7 is non-obvious over the cited art for at least this additional reason. Accordingly, withdrawal of the rejection is respectfully requested.

**iv. *Lourigan does not teach a full-bridge circuit as recited in claim 23.***

Claim 23 is directed to a timer circuit comprising a full-bridge circuit. The full-bridge circuit is operable to receive a sinusoidal line voltage signal at an input and ***provide a full-wave rectified voltage signal at an output thereof.*** Lourigan fails to teach or suggest the above feature. Rather, Lourigan discloses providing a half-wave rectified signal via the diode 30. This difference is not inconsequential; the half-wave rectified current of Lourigan provided to the solenoid 16 has time periods associated therewith when the current is approximately zero for an extended period of time. During such time, the solenoid coil 16 is not activated or energized, and the solenoid plunger associated with many types of solenoid valves begins to return to its "at-rest" location (i.e., become unseated), instead of staying in its desired, energized location. In contrast, the full-bridge circuit of the present invention provides a full-wave rectified voltage signal, and the current provided to the solenoid associated therewith is a full-wave current without extended periods at which the current is approximately zero. Consequently, the full-bridge circuit of the present invention advantageously facilitates a constant activation of the solenoid during activation periods, thereby maintaining the solenoid plunger in its seated position throughout the activation time period. Nakamura et al. do not remedy the deficiencies in the primary reference. Therefore claim 23 is non-obvious over the cited art.

**II. CONCLUSION**

For at least the above reasons, the claims currently under consideration are believed to be in condition for allowance.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should any fees be due as a result of the filing of this response, the Commissioner is hereby authorized to charge the Deposit Account Number 50-1733, RWBP101US.

Respectfully submitted,  
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**CERTIFICATE OF MAILING**

I hereby certify that this paper (along with any paper or item referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first-class mail in an envelope addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Date: June 2, 2004

  
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